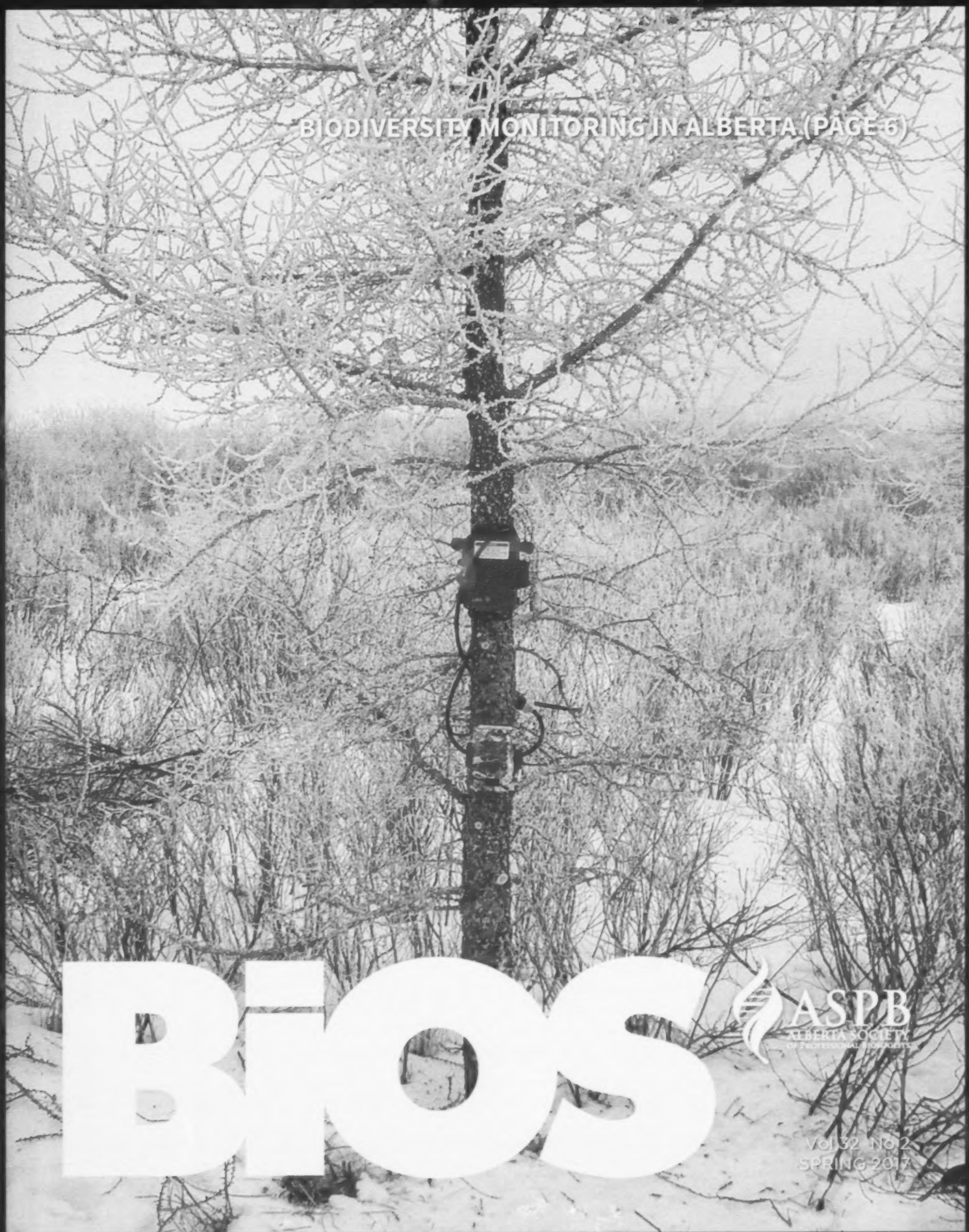

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BIOS

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ALBERTA SOCIETY OF TECHNOLOGY IN BIOLOGY

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ASPB
ALBERTA SOCIETY OF PROFESSIONAL BIOLOGISTS

370, 105 - 12th Ave SE
Calgary, AB. T2G 1A1
T: 403.264.1273
E: pbiol@aspb.ab.ca
W: www.aspb.ab.ca

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mentoring@aspb.ab.ca

BIOS

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Editor:
Peter G. Kingsmill

Articles or comments are welcomed and should be sent to announcements@aspb.ab.ca

... notes from the E.D.

While it is still chilly as I write this, the sight of the first robins yesterday brings me hope of spring. It has been a busy Q1 2017 preparing for AGM, the wildlife workshop and other ASPB events while continuing to assist the Board and other committees perform their respective functions and to improve the knowledge of all volunteers about what is happening within the organization.

As well, with the help of Christina in the office, we are exploring how we can expand our use of webinars and other digital tools to help members stay in touch with what other biologists are working on, regardless of where they are in the province. The professional development committees in Calgary and Edmonton have also been exploring some new ideas – beyond brown bag lunches – to expand PD opportunities for our members.

This upcoming year will be an opportunity to embrace change and work with the Board to establish foundations for the administration and governance of the organization, ensuring it can be resilient into the future. The Society will also need to focus on another one of our priorities: improving and refining our standards for admission, equivalency and competency.

The past few years have seen much action around our bylaws as we transitioned to accepting the biology technologist sectors into the Society. This year's AGM will afford us a period of rest from changing bylaws; there are no proposed changes this year! The changes last year have resulted in changes to our membership roster as we have accepted three Registered Biological Technologists in Training (RBIT), seven Registered Technologists in Biology (RTBio), and seven Biological Technologists in Training (BTT) into our Society since the last AGM. Of course, there were also new members added through the pre-existing categories during the same period, for a total of 240 new members.

The decision to step back this year from hosting a two-day conference was not taken lightly. The Annual ASPB Conference has been somewhat of a fixture over the years, but in a time of fiscal constraint and uncertainty – not just for the organization itself but for our members as a whole – the annually increasing costs of mounting the event threatened to put attendance out of reach for many. Happily, there has been a lot of enthusiasm about putting together a one-day wildlife workshop in early April, and we look forward to seeing many of our members at that event!

Susan Patey LeDrew, Interim Executive Director

On the cover...

The cover of this issue shows a typical monitoring setup with an SM4 ARU (autonomous recording unit) on top and a trail camera below. The cable is a lock that holds everything to the tree and prevents bears or vandals from making off with the gear. The installation is put in place and maintained by the Alberta Biodiversity Monitoring Institute, and collects data used in the institute's research.
Photo Credit: ABMI

Message from the President...

Elvie Reinson

As I reflect on my term as the ASPB president, I am amazed at not only how quickly it has gone by, but also at how much we've accomplished. The Board has focused on change in the past year, which is better positioning us for the future. We have three broad vision goals: legislation change to include mandatory registration; improving our registration process; and education around the ASPB being an excellent regulatory body protecting the people of Alberta. I look forward to continuing my participation on the Board under the leadership of incoming president Lawrence Levinson, and being part of the vision he brings.

In 2016, the Board saw the introduction of six new members and – with that – an influx of new ideas and points of view. It is with great gratitude I thank three outgoing board members for their years of service to the organization: Shaun Toner (who served this year as past-president), Angela Holzapfel (who has served a number of years as our Board secretary), and Karoliina Munter, (a former president) whose term as director-at-large ends this year.

As most of the accomplishments of the Society are achieved through the hundreds of hours that many of the ASPB's volunteers dedicate every year, I want to thank you all for your time and effort. I especially want to thank the Board members for their dedication and support during a challenging but rewarding year, and in addition I want to thank Susan Patey LeDrew and Christina Golubic for doing a great job in the ASPB office.

Join us April 5th at the ASPB's

WILDLIFE WORKSHOP

Please join the Alberta Society of Professional Biologists and representatives from Alberta Environment and Parks for a day of presentations and discussions on key issues including:

- **FWMIS presentation/interactive session**
- **Permitting guideline updates by Robin Gutsell**
- **Renewables – wind and solar directives**

Date: **April 5th, 2017**
Time: **8:00 am - 4:30 pm**
Location: **Calgary Zoo - Safari Lodge**

Continually updated information and registration details are available on the ASPB website:
http://www.aspb.ab.ca/events/-wildlife-workshop

Growing the profile of microbiology drives this practice area steering committee

Markus Thormann, P. Biol., chairs the Microbiology Practice Area Steering Committee (MPASC) for the Alberta Society of Professional Biologists, and has been a frequent contributor to BIOS. The following is from his contribution to the Society's Annual Report:

The MPASC was established in late 2014 with the intent of coordinating activities for practitioners in this practice area on behalf of the ASPB membership. The goal is to have its members work together to share and distribute information pertaining to the management of microbiology within Alberta. The MPASC has four members and has held three meetings via teleconference in 2016.

The main focus of activities in 2016 was to advertise the MPASC to the ASPB membership. To that end, we published two articles in BIOS, one about the art of beer making and a second about genomic applications towards the remediation and reclamation of contaminated sites. In addition, we joined the Practice Review Committee to assist with the application review process for those potential members with a background in microbiology (*sensu lato*). Particularly the latter endeavor has resulted in the acceptance of several new members into the ASPB who had microbiology educational and professional backgrounds in 2016.

The main driver for the MPASC in 2017 will be continued efforts towards advertising the MPASC to the ASPB membership. This will be accomplished via the publication of additional articles in BIOS, the organization and participation in Bios-and-Brews events in Edmonton and Calgary, and regular MPASC teleconferences throughout the year.

Professional Development Committees host a number of popular events

Calgary

The Calgary PD Committee was chaired by Ken Chatel and Karl Bresee, P. Biol., during the 2015/2016 operations year with Mr Bresee taking over the role as Chair in the fall of 2016. Their report to the members is excerpted herewith:

The committee continued to explore new topics for Brown Bag Lunches (BBL) and continued to utilize the website through Events Listings; posting speakers' presentations, initiating discussion forums; and providing BBL access via webinars. The committee hosted 8 BBL covering topics on regulatory guidance, expert testimony, fish, invertebrates, wildlife collisions, and remediation. BBLs were hosted at the Husky Conference Centre with coordination by Torey McLeish or at the Nexen Building with coordination by Trevor Dorey. The Committee also hosted three workshops (Amphibian ID, Bird ID and Fish ID). No social events were held due to low participation at earlier events. Attendance overall was 143 people in person at BBLs with 141 attending on-line.

Edmonton

The Edmonton PD Committee was chaired by Chris Newton, P. Biol., who submitted the following report:

As everyone is well aware, 2016 was a very challenging year. Geopolitical regime shifts, economic uncertainty and natural disasters changed everyone's focus and priorities. The Edmonton Professional Development committee was not immune to these events of the year, and as a result many key members stepped down in response to the new roles, ventures and responsibilities of committee members.

A few events were still hosted with great response and positive feedback. Alberta Environment and Parks made a presentation on the New Wetland Policy in March 2016, an event which brought out over 70 individuals all excited to hear the new updates. The presentation was excellent and addressed numerous points of the policy; if time had been available I think the question and answer portion would have continued well into the evening!

Shona Derlukewich instructed the Fishes of Alberta Identification workshop at MacEwan University for the 3rd year in a row, and as always this workshop is extremely popular with consultants, students and regulators. This workshop is an excellent opportunity for anyone working aquatic systems to learn from a seasoned professional who has first class knowledge of the fishes of Alberta.

Our periodic social event, Bios and Brews, continued throughout the first few months of the year at a few different locations, trying to capture biologists scattered throughout the city. These are always fun events where one can have a casual conversation with fellow peers and share the latest triumphs of field work.

The goal of everyone within the committee (and with those who have previously been involved) is to provide workshops, lunch-and-learns and networking events to biologists within the Edmonton area. As our province continues to grow, the need for professionals who are adequately trained is going to increase. Workshops, conferences and events that can foster growth are imperative to members of our organization and events within both the Edmonton and Northern Alberta regions are needed. We invite and welcome those who wish to share their knowledge, and we hope to promote more events that spur additional opportunity for outreach.

Information submitted by Chris Newton, P. Biol., Chair

University/municipal partnership (Calgary) studies impact of contaminants in river water

by Kyna O'Gallagher, MScF, RPF, P. Biol.

On January 25, 2017, the Calgary Professional Development Committee had the pleasure of hosting Hamid R. Habibi, PhD speaking on the adverse health impact of environmental contaminants in Southern Alberta. Dr. Habibi captured the attention of the participants as evidenced by the insightful question period and the lively post-talk conversations; a synopsis of his report follows:

Dr. Habibi presented his team's findings that chemicals, in the form of pesticides, pharmaceuticals, personal care products, surfactants, fire retardants, herbicides and fungicides were present in water collected from rivers in Southern Alberta. Further Dr. Habibi discussed how these synthetic and environmentally persistent compounds can have adverse impacts on development. In ***Environmental Contaminants with Hormone-like Activity: Screening and Risk Characterization***[1], a recent article in Canadian Civil Engineer (2014), Dr. Habibi goes into further detail on the "evidence that these environmentally persistent compounds can mimic or block the effects of natural estrogens, androgens, and thyroid hormones, and are suspect of causing health defects in both humans wildlife through disruption of the endocrine system" (2014).

Dr. Habibi urged the audience to gain a better understanding of the origins, ecological and physiological pathways of these contaminants of emerging concern (CEC) by engaging socially, politically and professionally in the efforts to better control their ingestion and release into the environment. For example, Bisphenol A (BPA) was banned due to its connections to health issues during pregnancy and development: Bisphenol S (BPS), which is not banned in Canada, is now used as a replacement for BPA in several consumer products. In his research Dr. Habibi found that BPS is 1.7 times more toxic to fish than BPA. He also discussed the regulated application of fire retardant to carpets and the adverse impact of these compounds can have on development. He concluded by stating that policies that are set in place to protect the public must be based on good science.

To bridge this gap between research and implementation of new technologies, the University of Calgary has partnered with the City of Calgary's Pine Creek Wastewater Treatment Centre through Advancing Canadian Waste Water Assets (ACWA). The ACWA's goal is to help advance the future of clean water; according to its website, the "ACWA Research

Photo Credit: Leland Jackson, University of Calgary

Plant is designed to address two major research questions: (a) How can established and novel treatment technologies achieve improved removal of existing and emerging chemical compounds and pathogens to improve human health and the environment? and (b) How can the impacts of diverse pollutants on aquatic environments be critically evaluated?" Tours of the ACWA Research Facility can be booked by calling The City of Calgary 311 Operation Centre.

In 1988, Dr. Habibi joined the University of Calgary as an Assistant Professor and NSERC Scholar. Currently he is a full professor in the Department of Biological Sciences at the Faculty of Science, and Physiology and Pharmacology at the Cumming School of Medicine. Dr. Habibi's teaching and research interests are in the areas of comparative endocrinology and environmental toxicology. His research has contributed to the understanding of the mechanisms of endocrine disruption by environmental contaminants and of hormonal control of reproduction and growth, and led to development of technologies relevant to pharmaceutical, environmental and agri-food/aquaculture industries. He received a number of International awards and is the founding co-principle investigator and former acting executive Director of the Advances in Canadian Wastewater Asset (ACWA). He has served as the chair of committees of a number international conferences, including the 18th International Congress of Comparative Endocrinology to be held in Banff Alberta in June 2017.

The Professional Development Committee was delighted to have Dr. Habibi present at the Brown Bag Lunch and looks forward to having he and his graduate students present their on-going findings at a future session.

[1]Habibi, Hamid R. 2014. Environmental Contaminants with Hormone-like Activity: Screening and Risk Characterization. Technical: Emerging Contaminants in Water. Canadian Civil Engineer. 31.2:20-23.

"Neither snow nor rain nor heat nor gloom of night..."[1]
nor bitter cold in helicopters...

Biodiversity Monitoring in Alberta

by Kurt Illerbrun, Ph.D.

Snow and ice swirl as the chopper lifts off, a roaring blizzard against the dull February sky. As the engine fades into the distance, the snow settles to reveal two figures donning their heavy packs and setting out into the boreal forest. It's 32 below, somewhere north of Fort Chip – a normal day at the office for the Alberta Biodiversity Monitoring Institute's winter field crews. Each winter, these crews visit more than 200 sites across Alberta, installing automated cameras and audio recording units, and prepping the sites for full surveys later in the year. *It's our nature to know*, goes the ABMI motto. On days like this, *It's our nature to snow* seems more appropriate. But how did these crazy people come to be here in the first place? And what are they doing in the pages of *BIOS* quarterly?

It's a long story. In the late 1990s, with a growing population and expanding industrial activity, the question of how best to manage Alberta's land base was increasingly being raised. Which forestry practices had the lowest environmental impacts? Which species were harmed by human activities, and which benefitted? What was the real impact of petroleum exploration? Could infrastructure development be balanced with the need to preserve Alberta's natural heritage? Industry, government, and environmental groups agreed that policy decisions demanded independent, scientifically credible data on which to base them. Out of this recognition came the ABMI, an independent environmental monitoring organization informed by best scientific practices and guided by a board of directors from government, industry, academia, and environmental NGOs.

The idea was simple: go out, span the province, and monitor the natural world. But this is easier said than done. What to monitor? Where? How often? And with what ultimate goal? After years of pilot studies, consultation, and trial and error, the ABMI's monitoring program took its current form in the mid-2000s. The plan was to report on both the status and trend of biodiversity in Alberta, to remain value-neutral, and to make the resulting data freely and publicly available. Pulling this off meant, first, picking sites to monitor in perpetuity, gaining all the necessary permissions to access them, and establishing standard protocols for recording what was there. To ensure that sampling occurred in proportion to the activity types taking place, Alberta was divided into a uniform grid of sites from border to border – 1656 in all, spaced 20 km apart – and protocols were drawn up, refined, and refined again.

Using a helicopter to access remote locations is common practice; after landing the technicians walk the rest of the way to service the equipment and download data. Photo Credit: Nina Veselka

Second, it meant developing the institutional capacity to collect, process, manage, and circulate all this information. Today, the ABMI employs around 70 full time staff and hires an additional 50 or 60 technicians each summer, funded by government, industry, and other research funding organizations. We have tools – ATVs, trail cameras, snowshoes, even inflatable kayaks – to let us access the most remote corners of our province. We monitor and report on more than 2500 Alberta species from a variety of taxa. And we have six specialized 'Centres' within the organization that work with each piece of data from collection and classification, through analysis and mapping, to application, report-writing, and dissemination.

The ABMI is unique. It's among the largest environmental monitoring programs in the world, and it stands as an example to similar initiatives elsewhere that are just getting on their feet. At the same time, it's still growing and adapting. Monitoring protocols need to be kept up to date based on the latest research, and new developments in the fields of autonomous recording devices and remote sensing can turn established practices upside down (until recently, those intrepid winter fieldworkers manually counted animal tracks; now they deploy a battery of trail cameras). Sometimes an unpredictable event like a wildfire can force survey sites to be relocated on the fly. Nearly two decades after its inception, the ABMI continues to evolve and seek innovative ways to improve its program and better serve Albertans.

Which raises the question of how people are actually using ABMI data. In some ways, we have a pretty good idea of this. For example, the ABMI provides the Government of Alberta's

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[1] Excerpted from motto of US Postal Service

Biodiversity Monitoring...*(continued from page 6)*

Land Use Secretariat with information on the extent and type of human footprint across the province, and we collaborate with many other data users. But this, too, is evolving – what our users need, what we can do better, and how we can stay on top of best practices while keeping our output user-friendly and accessible. There's always more to do.

So it's a two-way street, which brings us to what we're doing in *BIOS* quarterly, and why we're honoured to share this space. From time to time, the ABMI releases new research or data products that we think would interest members of the ASPB. For example, sometimes our Science Centre publishes methods in what we call *Science Letters*. Or another ABMI Centre might release a new data product, like our Application Centre's tool for measuring and valuing ecosystem services, or our Geospatial Centre's recent release of an updated Human Footprint Inventory for Alberta. Starting next issue, we'll use this space to talk about ABMI data and research that we think will be interesting and hopefully useful to your work.

But we're also interested in hearing from you. Do you use ABMI data in your work? What can we do to better meet your needs? Or perhaps you have an idea for a new analysis or application that uses ABMI data. Whatever it is, we hope that our presence in *BIOS* starts some conversations, gives you some new ideas, or at least makes for interesting reading at the breakfast table.

And, speaking of breakfast tables – as you sit there with your warm cup of coffee, spare a thought for those winter field techs, all bundled up and sipping tea from a thermos in Fort Chip as the chopper fades into the distance once again. Their work makes possible everything we do at the ABMI. Then again, they wouldn't have it any other way.

ABMI techs get as close to a given survey site as they can using trucks and/or quads or helicopters, and then "hoof it" from there! The multi-coloured pole is a scale reference that gets set up in view of each trail camera, providing standardized interpretation of the resulting photos. This photo was taken near Fort McMurray. Photo Credit: Kate Tucker

BIOS welcomes this collaboration with ABMI to share interesting and important biodiversity information with our readers, and especially thanks Kurt Illerbrun (ABMI Northern Communications Advisor) for his cooperation and inspiration bringing it all together. Kurt can be reached at abmicoms@ualberta.ca, and the ABMI website is at www.abmi.ca.

Registration Committee:
New member categories make for a busy year

by Jeremy Reid, P. Biol., Chair

The mandate of the Registration Committee is to determine whether applicants to the ASPB have the academic qualifications, experience, and good character for professional designation from the Society. Applications for membership are assessed by at least three professional biologist members of the Registration Committee while student applicants are reviewed by the Executive Director. The committee meets monthly and currently includes eight members and the ASPB Registrar.

During 2016, the Registration Committee approved 240 new members for acceptance into the Society under the various categories. The applications of these new members were reviewed using a newly implemented procedure aimed at providing greater focus on complicated applications. The new procedure relies on initial screening by the Registrar to identify routine applications which are presented to the Registration Committee for consent.

With greater focus on complicated applications, the Registration Committee contemplated numerous challenges within the registration procedure, particularly with respect to equivalency and the admission requirements thereunder. In identifying the need for more structure and consistency in such reviews, the ASPB Board temporarily suspended acceptance of

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Responding to Whirling Disease in Alberta Waters

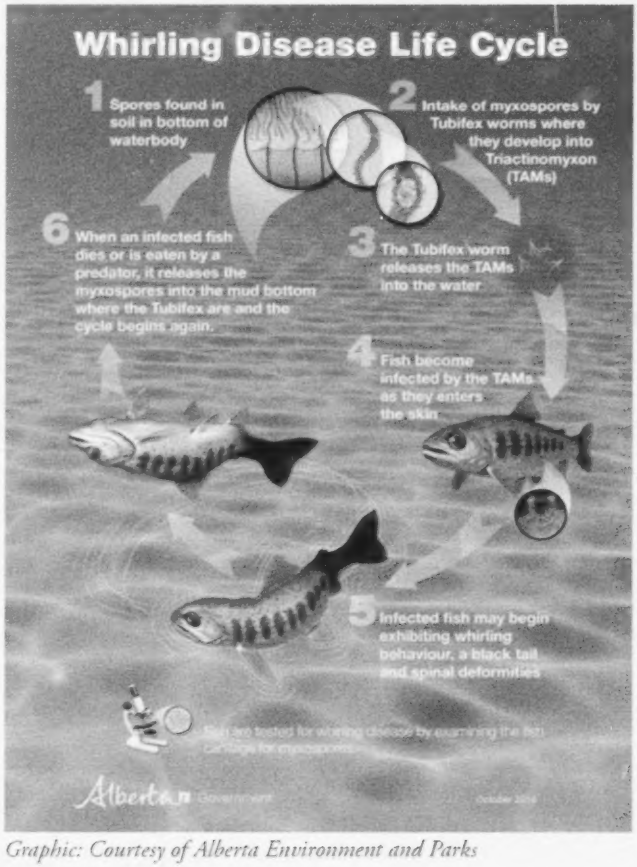
by Kate Wilson, Aquatic Invasive Species Specialist with Alberta Environment & Parks

Whirling disease is becoming more widely known in North America as a serious fish health issue. It can affect salmonid populations including trout and whitefish, and is caused by a microscopic parasite called *Myxobolus cerebralis*. The parasite also requires a segmented worm, *Tubifex tubifex*, a species native and common in Alberta waters. *Myxobolus* requires two hosts to complete its life cycle – salmonid fish and the *tubifex* worm. The parasite is not transmissible to humans or wildlife.

The impacts of the disease can be highly variable, depending on species susceptibility and environmental factors, but can lead to spinal deformities, erratic swimming and death of affected fish. Not all susceptible species exhibit signs of whirling disease – for example, brown trout are known to be carriers/hosts of whirling disease, but have been found to be quite asymptomatic. Westslope cutthroat trout and some strains of rainbow trout, however, are highly susceptible. There is concern that a fish disease like this could really prove to be problematic for species at risk, especially in locations where there is already a fair amount of disturbance or habitat issues. Anglers will want to pay special attention to whirling disease positive waters, and ensure that they take the necessary steps to curb the spread of the disease to uninfected waters.

In August 2016, the first detection of whirling disease was reported in Canada, inside Banff National Park at a popular fly fishing spot, Johnson Lake. It is not known how the parasite was introduced, but research and literature suggest it is most commonly introduced primarily by the movement of infected fish, either by fish culture practices or anglers. It can then be spread downstream or with movement of fish, but also by fishing and boating activities, any kind of in-water work, and even potentially waterfowl. The parasite is introduced to a waterbody in the form of microscopic spores found in the bottom of the river or earthen pond, in the sediment. The spores are then ingested by the *tubifex* worm, which is found in some waterbodies in Alberta. Fish most often contract the disease unknowingly, as once the parasite matures inside the infected worm, it produces tiny triactinomyxons ("TAMS") that are carried in water currents and can infect a fish through the skin. Penetration of the fish by these TAM spores takes only a few seconds; within a few hours, the infectious sporoplasm is spreading via the nerves ; this process takes days to weeks, eventually reaching the cartilage where most of the damage occurs. The organism has sequential affinity for skin, nerves & finally cartilage of the fish. Once a tubifex is infected, it is infected for the life of the worm.

Whirling disease mainly affects juvenile fish, such as fingerlings and fry, causing skeletal deformation and neurological damage. Fish exhibiting signs often "whirl" forward in an awkward,


Whirling Disease Life Cycle
1 Spores found in soil in bottom of waterbody
2 Intake of myxospores by Tubifex worms where they develop into Triactinomyxon (TAMs)
3 The Tubifex worm releases the TAMs into the water
4 Fish become infected by the TAMs as they enters the skin
5 Infected fish may begin exhibiting whirling behaviour, a black tail and spinal deformities
6 When an infected fish dies or is eaten by a predator, it releases the myxospores into the mud bottom where the Tubifex are and the cycle begins again.

Graphic: Courtesy of Alberta Environment and Parks

corkscrew-like manner, have difficulty feeding, and are much more vulnerable to predators. The mortality rate can be high for affected fry/fingerlings with losses up to 90 percent of an infected population. Those that survive heavy infection may be deformed by the parasite's destruction of cartilage and resulting abnormal bone formation (e.g. crooked tails). These survivors, as well as asymptomatically infected fish, are carrier fish that can then act as a reservoir for the parasite, which is released into water/sediment following the fish's death.

The Government of Alberta took immediate action upon being notified of the detection in Banff National Park in August, working closely with the Canadian Food Inspection Agency (CFIA) and Parks Canada. The "Early Detection, Rapid Response" Plan developed for invasive *Dreissenid* mussels was utilized for the response, given the many similarities with an invasive mussel introduction (larvae are microscopic) and spread. An Incident Command System was set up to respond to the detection, as well as teams to address the myriad of aspects needed in a response, including policy development, risk assessments, mapping, communications and monitoring. Fisheries biologists province-wide were deployed to sample all

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Whirling Disease...*(continued from page 8)*

"susceptible waters" in the province (e.g., waters that support trout and whitefish), which over the course of a few months equated to more than 200 sites in six watersheds.

Whirling disease cannot be detected directly in water or soil samples, so fish tissue must be sampled. Wild fish samples were collected last fall by Alberta Environment and Parks staff and stored in -80°C freezers; but we currently do not have the ability to analyze such large numbers internally, so this has created some delay in obtaining results. Samples are being processed by both CFIA labs and AEP labs; presently we're working with the University of Alberta for molecular testing of *Myxobolus cerebralis*, a test which has more sensitivity than spore detection, thus is more appropriate for smaller fish. At this time, some salmonids in the Bow River watershed have yielded positive results for the Whirling disease agent. The CFIA posts positive results on their website when they are confirmed. Decontamination protocols are in development for all government staff conducting in-water work, and more information on the issue and what you can do can be found on the AEP website.

Currently, fish from several locations within Banff National Park, as well as many locations outside of the Park in the Bow River watershed (including some tributaries) have tested positive for *Myxobolus cerebralis*. In addition, fish from five private aquaculture facilities have also tested positive, all of which are currently under quarantine. This means that no fish or fish culture equipment is allowed to leave the positive facilities until infected fish are no longer present, the facilities are decontaminated and deemed to no longer be a risk by the CFIA and the Government of Alberta.

Photo: Courtesy of Alberta Environment and Parks

Be part of the solution! Fish diseases and aquatic invasive species are commonly spread by organic material (fish, plants), mud and standing water. It is imperative that anglers, boaters, aquatic ecologists, researchers and anyone coming into contact with water **CLEAN** all equipment, **DRAIN** any residual standing water and **DRY** watercraft, waders and equipment thoroughly before using again. These "boat and gear hygiene practices" are always a good idea, as this reduces the chances of spreading all kinds of aquatic invasive species. But these practices are especially important for those who are going from positive zones to susceptible waters. If possible, use hot water (90°C) to wash your gear, and ensure water does not go down a storm drain or enter surface water. If you are using a boat, the drain plug must be pulled while in transport - it's the law! Boat inspections are mandatory for all passing watercraft when inspection stations are open. Do your part to protect Alberta waters from aquatic invasive species and fish disease – CLEAN, DRAIN and DRY your watercraft and equipment before you leave the launch/lake every time. To report suspect fish or aquatic invasive species, please call **1-855-336-BOAT (2628)**.

Disinfection Protocols for Recreational Users

by Ashley Hillman, BIT and Jay White, P. Biol.

In addition to a hot water wash for equipment and boats, a disinfecting treatment should be applied to ensure Whirling Disease is not being spread. Alberta Environment and Parks recommends Quat Plus for use in combating Whirling Disease. Quat Plus is a liquid disinfectant that effectively kills the pathogen that causes Whirling Disease, and can be safely flushed down the drain. Smaller equipment, such as waders, boots, ropes, or fishing rods can be submerged in a Quat Plus solution, diluted to 1500ppm, completely submerged for 10 minutes. Soaked items can then be rinsed with clean water and left to dry, preferably in sunlight. Larger items that cannot be soaked, such as boats, should be sprayed or wiped with 1500ppm Quat Plus solution. The surface of the boat should remain wet with the solution for 10 minutes. After disinfection, the boat should receive a hot water cleaning (90°C), and then sprayed for a second time with a Quat Plus solution. After soaking for another 10 minutes in the solution, the boat can be allowed to dry for 24 hours. While it may seem like a lot of work, this protocol will effectively combat the spread of Whirling Disease throughout Alberta.

Aquality Environmental Consulting, in partnership with Alberta Environment and Parks and the Edmonton Trout Fishing Club, are in the process of finalizing an educational website on Whirling Disease prevention. The website, www.albertaaquaticinvasives.ca, will provide the public with information and disinfection protocols for all aquatic invasive species, with an emphasis on Whirling Disease. Information provided will include life history traits of other invasive species and methods for preventing their spread. Stay tuned for the release of this website!

Bees need sanctuaries too!

by Saikat Kumar Basu, BIT

Bees, along with other pollinators, constitute the most important natural component of pollination that significantly contributes to agriculture and forestry and in turn serves a healthy, diverse ecosystem. Unfortunately, the native bee populations throughout North America have been showing a steady decline because of a number of factors including environmental pollution, ecological stress, disease, lack of food sources and therefore insufficient nutrition. It is a matter of concern across the continent to help the native bee populations thrive once again in order to secure the future of our agriculture and forestry and to protect the diversity and integrity of our natural ecosystems. Bees are commercially farmed to help in natural cross pollination to produce honey and natural bees wax, in a practise is known as Apiculture. Alberta is the leading honey producer in Canada.

One easy – and sustainable – approach to help the native bee populations to thrive across the Prairies is to establish Bee Gardens (BGs) or Pollinator Gardens (PGs) or Bee Habitats (BTs) or Bee Sanctuaries (BSs). (These are also referred to as Bee Forage Gardens (BFGs) or Pollinator Forage Gardens (PFGs) and are small patches of natural habitats with a mix of native prairie grasses and wild flowers which attract many species of native bees as well as other pollinators present in our local ecosystems. It is important to develop special seed mixes comprised of a mixture of different varieties including a number of commercially available pollinator-friendly wildflower species as well as native grasses and/or wildflower mixtures, commonly referred to as Bee Mixes (BMs) or Pollinator Mixes (PMs). These specially developed mixes can be planted in our urban and rural backyards, lawns, city parks and gardens, along ditches, swamps, marshes and meadows, adjacent to agriculture fields or along irrigation canals to attract bees and other pollinators across the seasons. It is important that the mixes consist of early-, mid- and late-flowering species so that they can continue to provide nectar and pollens throughout the season, even covering pre- and post-agricultural production season to prolong the pollinator foraging season.

Such bee sanctuaries could eventually become a major factor for re-establishing our native bee species across the Prairies. Reliable mixes are available from major horticultural and nurseries across the U.SA. but Canadian opportunities are currently limited and need to be popularized for developing a steady market for producers.

Photo Credit: Saikat Basu

This simple yet innovative approach offers an important opportunity for producers, home makers, cities, corporate houses, farmers, municipalities, counties and colonies to contribute significantly in rebuilding and sustaining our dwindling native bee populations. Bee sanctuaries can serve as effective launching pads for rejuvenating our native bee populations by extending the bee foraging season and establishing sustainable bee habitats. By providing quality bee nutrition in this waygive these important pollinators a chance to make a comeback; bee sanctuaries may hold the key to conserving the potential of our agriculture and forestry industries in the not so distant future!

(The author acknowledges Performance Seed for information in this article.)

Some key bee-favoured flowers and grasses:

White blossom sweet clover (*Melilotus alba*)
Yellow blossom sweet clover (*Melilotus officinalis*)
Buckwheat (*Fagopyrum esculentum*)
Red Clover (*Trifolium pratense*)
Annual Sunflower (*Helianthus annus*)
Showy Sunflower (*Helianthus annus*)
Lavender Hyssop (*Agastache foeniculum*)
Common Wild Rose (*Rosa woodsii*)
Beeplant (*Cleome serrulata*)
Lance-Leaved Coreopsis (*Coreopsis lanceolata*)
Plains Coreopsis (*Coreopsis tinctoria*)
Prairie Aster (*Machaeranthera tanacetifolia*)
Chinese Forget-Me-Not (*Cynoglossum amiable*)
Purple Coneflower (*Echinacea purpurea*)
Aspen Daisy (*Erigeron speciosus*)
California Poppy (*Eschscholzia californica*)
Lacy Phacelia (*Phacelia tanacetifolia*)
Globe Gilia (*Gilia capitata*)
Tidy Tips (*Layia platyglossa*)
Sweet Alyssum (*Lobularia maritima*)
Forget-Me-Not (*Myosotis scorpioides*)
Baby Blue Eyes (*Nemophila menziesii*)
Rocky Mountain Beeplant (*Cleome serrulata*)
Ohio Spiderwort (*Tradescantia ohiensis*)
Black Eyed Susan (*Rudbeckia hirta*)
Borage (*Borago officinalis*)
Showy Tick-Trefoil (*Desmodium canadense*)
Wild Columbine (*Aquilegia canadensis*)
Perennial Gaillardia
Lemon Mint (*Monarda citriodora*)
Fleabane Daisy (*Erigeron speciosus*)
Poppy (*Papaver sp.*)
Marigold (*Tagetes sp.*)
Perennial Lupines (*Lupinus sp.*)
Coneflower (*Rudbeckia sp.*)
Cardinal Flower (*Lobelia cardinalis*)
Wild Bergamot/Horsemint (*Monarda fistulosa*)
Pumpkin (*Cucurbita pepo*)
Squash (*Cucurbita sp.*)
Blueberry (*Vaccinium sp.*)
Foxglove (*Digitalis purpurea*)
Chive (*Allium schoenoprasum*)
Sticky purple geranium (*Geranium viscosissimum*)
Hollyhock (*Alcea sp.*)
Goldenrod (*Solidago sp.*)
Wild vetch (*Vicia sativa*)
Yellow beard tongue (*Penstemon pinifolius*)
Blanket flower (*Gaillardia x grandiflora*)
Butterfly weed (*Asclepias tuberosa*)
Hairy Beardtongue (*Penstemon hirsutus*)
Swamp Milkweed (*Asclepias incarnata*)
Blue lobelia (*Lobelia siphilitica*)
Catnip (*Nepeta cataria*)
Blackberry (*Rubus sp.*)
Raspberry (*Rubus sp.*)
Evening Primrose (*Oenothera biennis*)
Butterflyweed (*Asclepias tuberosa*)
Wild Columbine (*Aquilegia canadensis*)
Tall Cinquefoil (*Drymocallis arguta*)
Hairy Beardtongue (*Drymocallis arguta*)

Hatching successful events for professional development

With Professional Development Committees in both Edmonton and Calgary, the ASPB is able to host a growing number of events throughout the year except during summer field season. An increasing number of events are being offered as webinars to make them more available; not all, however, lend themselves to webinars! The following article about a visit to the Sam Livingston Fish Hatchery in Calgary was written by committee member Jennifer Raffan, BIT.

Photos: Jennifer Raffan

As a member of the ASPB's Professional Development Committee (Calgary), I often have the privilege of organizing and attending BBL's (Brown Bag Lunches), workshops, and tours. On a snowy morning in early February, I had the opportunity of hosting a tour of the Bow Habitat Station and Sam Livingston Fish Hatchery in Pearce Estate Park in Calgary.

We were warmly welcomed by our guide, Ian Langill, and the rest of the hatchery staff. The tour started with a few biosecurity measures (due to the confirmation of Whirling Disease in Alberta), including washing our hands and stepping over a disinfectant mat. From there we were guided behind the scenes in what I learned was North America's second largest inland fish hatchery. We witnessed spirited trout through each stage of development, from eggs, through fry, into adults. We even learned that the 'fishy' fragrance of the facility was due to the fish food rather than from the fish themselves, and we even got to feed the voracious vertebrates. Watching the automatic feeders created quite the stir too; everyone was captivated by both the complexity and (in some ways the simplicity) of the operation.

The Sam Livingston Fish Hatchery is run by Alberta Environment and Parks. It is vital to the province's stocking program, raising 1.3 million fish annually, made up of rainbow, brown, brook, cutthroat and bull trout, as well as arctic grayling. The hatchery enjoys a very successful fish survival rate after decades of experience, with each species having slightly different survival percentages, some well above 60%. These hearty fish are then trucked to their new homes throughout the province and even into the United States, to keep our streams teeming with life.

As a native Calgarian, I was astonished that I had never visited the hatchery before; there is so much to do there! In addition to the tour, we also got to experience the Discovery Centre, which does a marvellous job of hands-on education about Alberta's diverse flora and fauna, and also viewed the 12 impressive freshwater aquariums. There is even a catch-and-release trout pond (open through the summer and shoulder seasons only), and many programs including fishing clinics, as well as an Interpretive Wetland in the 'Bend of the Bow'. Snowshoes are even available for rent through the winter to explore beautiful Pearce Estate Park!

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So the next time you catch a fish in Alberta's waterways, think to yourself, "I wonder where this fish came from?" And, if you have never experienced the wonder that is the Bow Habitat Station, I highly recommend it as "the experience will leave you hooked!"

Christine Houghton appointed Executive Director at BC-CAB

The College of Applied Biology in British Columbia has announced that Christine Houghton will be joining the College as Executive Director effective February 7, 2017. "We are very excited that Christine is joining the College," said Dr. Vanessa Craig, the College Council President. "Her leadership abilities, strategic insight, and management skills developed while working in government and for non-profits will be an asset. Her energy and enthusiasm is invigorating; I look forward to working with her."

Over the past four years Ms Houghton worked as a consultant on a variety of projects, including the Capital Regional District's wastewater treatment project and, most recently, as an Environmental Management Advisor in Calabar, Nigeria. Prior to becoming a consultant, she spent over fifteen years working for the Government of British Columbia's Ministry of Environment. In that capacity, she led the revision of many results-based regulations and policies for the Environmental Protection Division before becoming the Executive Director of Visitor Services for BC Parks.

The College of Applied Biology regulates over 2,300 applied biology professionals.

Registration Committee...*(continued from page 7)*

equivalency applications on November 23, 2016.

In addition to working with the Board and Practice Review Committee to address equivalency, and other registration process issues, the Committee looks forward to the continued review of the new categories Registered Technologists in Biology and Biological Technologists in Training in addition to the pre-existing designations of the Society. In 2017, the Committee expects to further align its policies and procedures with the expectations of the Board in continuing to enhance the rigour and standardization of the ASPB registration process while applying it to the diverse applications received by prospective members.

The Chair would like to thank the members of the Registration Committee: Nick Bartok, Bruce Cole, Sandra Meidingers, Mike Peckford, Markus Thorman, Collins Ugochukwa, and especially our longest serving member Henri de Pennart. Your time and dedication to long evenings of reviews and discussion about how best to apply our registration policies is greatly appreciated. A special thanks as well from the Committee to your ASPB Registrar Janet Bauman.

Our members publish

BIOS is pleased to include information about professional and technical publications by our members, who may provide us with the author(s) name(s), title, date published and availability (where published, and an internet link if it is available online). The bibliography will reflect material published within the year preceding and including the current BIOS edition. The following publications have been submitted by ASPB Members; the name of the Member submitting the information is **bolded**.

Cameron J. Nordell, Samuel Hache, Erin M. Bayne, Peter Solymos, **Kenneth R. Foster**, Christine M. Godwin, Richard Krikun, Peter Pyle, Keith A. Hobson. (2016) Within-Site Variation in Feather Stable Hydrogen Isotope (δ2Hf) Values of Boreal Songbirds: Implications for Assignment to Molt Origin. *Plos One*

Kenneth R. Foster, Christine M. Godwin, Peter Pyle, James F. Saracco. (2016) Reclamation and habitat-disturbance effects on landbird abundance and productivity indices in the oil sands region of northeastern Alberta, Canada. *Restoration Ecology*

French RLK, Roberto-Charron A, **Foster KR** (2016) The accuracy of wing chord ranges in Pyle (1997) as indicators of sex in north-central Alberta populations of Least Flycatcher, Myrtle Warbler, and Clay-colored Sparrow. North American Bird Bander 41:116-125

Pyle P, Godwin CM, **Foster KR** (2015) Identifying juvenile warblers: the fun really begins here. Birding 47:58-69

Tondu, J.M.E., Turner, K.W., Wiklund, J.A., Wolfe, B.B., Hall, R.I., McDonald, I. 2016. Limnological evolution of Zelma Lake, a recently drained thermokarst lake in Old Crow Flats (Yukon, Canada). Arctic Science. *http://www.nrcresearchpress.com/doi/abs/10.1139/AS-2016-0012#.WH1pJfnF_vc*

Beth MacCallum, Chiarastella Feder, Barry Godsalve, Marion I. Paibomesai and Allison Patterson. 2016. Habitat Use by Harlequin Ducks (*Histrionicus histrionicus*) during Brood-rearing in the Rocky Mountains of Alberta. Canadian Wildlife Biology & Management 2016: Vol 5, Number 2: 33-45. *http://cwbm.name/*

Doell, D. and **D.A. Locky** (2016). Trends in wildlife intake at a rehabilitation centre in Central Alberta: A retrospective analysis of birds, mammals and herptiles, 1990-2012. Journal of Wildlife Rehabilitation 36: 17-29. *Abstract/First Page Available at: https://www.researchgate.net/publication/281119301*

Stoneman R., C. Bain, **D. Locky**, N. Mawdsley, M. McLaughlan, S. Kumaran-Prentice, M. Reed, and V. Swales. May 2016. Chapter 19: Policy Drivers for Peatland Conservation. In Peatland Restoration and Ecosystem Services: Science, Policy, and Practice. A. Bonn, T. Allot, M. Evans, H. Joosten, and R. Stoneman (Eds.). Ecological Review Series, Cambridge University Press, UK. ISBN: 9781107619708.

Fitch, L. 2016. Caring for the Green Zone: Beaver - Our Watershed Partner. Lethbridge, Alberta: Cows and Fish - Alberta Riparian Habitat Management Society